Research Article

Indian Journal of Extension Education
Vol. 59, No. 3 (July–September), 2023, (97-101)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Index based Assessment of Factors Affecting Farm Diversification in Haryana

Elizabeth Jose[1]*, K. Ponnusamy[2] and M. L. Kamboj[3]

[1]Research Scholar, [2]Principal Scientist, Dairy Extension Division, [3]Principal Scientist, LPM Division, ICAR-NDRI, Karnal, Haryana, India
*Corresponding author email id: joseelizabeth987@gmail.com

ARTICLE INFO

Keywords: Factors, Diversification, Haryana, Mono cropping, Sustainability

http://doi.org/10.48165/IJEE.2023.59318

Conflict of Interest: None

ABSTRACT

The study aimed to assess the factors affecting farm diversification was conducted in Kaithal, Hisar, and Bhiwani districts of Haryana in 2021 by selecting 180 farmers and 60 experts. The factors influencing farm diversification were assessed through the index method, Garret ranking, and RBQ method. The proximity of the National Capital Region (NCR), increased road density, and improved access to market information were found to favour the diversification of farm enterprises whereas, market uncertainties and climate induced factors were perceived to hinder it. Farmers did not show interest in *kharif* crops such as maize, sorghum, pearl millet, and cotton in the study area, mainly because of non-availability of labour at an affordable rate for manual harvesting. The findings act as supporting evidence of the factors that are beneficial for achieving sustainability in the future farming sector of Haryana.

INTRODUCTION

Agriculture provides the basic ingredients for the existence of humankind. About 68 per cent of India's population lives in rural areas where agriculture is the main occupation (Census, 2011). Indian agriculture is characterized by small farms. The average farm size is 1.15 hectares. About 86 per cent of farmers possess land size less than 2 ha, on which almost 44 per cent of the arable land is cultivated. On the other hand, only 14 per cent of the farmers have above 2 ha operational land holdings, however utilizing 56 per cent of the total cultivated land (Agricultural research data book, ICAR, 2020). In the late 1960s, the Green Revolution, which was successfully implemented in the states of Haryana, Punjab, and Western Uttar Pradesh, enabled India in overcoming a severe food shortage and achieving food grain self-sufficiency, particularly in the case of wheat and paddy. But on the other hand the sustainability of the future agricultural production system in terms of soil, water and climate characteristics is threatened by continuous mono cropping and the rice-wheat cropping system. Therefore, special efforts are needed to support diversified farming systems to improve the ground water table, handle issues with procuring and storing farm products, and address changes in food consumption patterns, particularly among middle-class and high-income groups (CRRID, 2017).

The current pace of progress of Indian agriculture needs to be ramped upto the demand of growing population and various targets set forth by national and international organizations. The importance of integration of other enterprises was always felt in Indian agriculture system to promote efficient use of available resources and convert them into a possible means of profitability by changing the focus of research from cropping systems towards farming systems. In this context present study has been undertaken to assess the factors affecting farm diversification in Haryana, which aimed to prioritize the factors which can accelerate diversification options in the state.

METHODOLOGY

The study was undertaken purposivelyin three agro ecological zones of the state (HKA, 2017). One district from each Agro-Ecological Zone (AEZ) was chosen randomly (Kaithal from AEZ1, Hisar from AEZ2 and Bhiwani from AEZ3). Two blocks namely Kaithal and Siwan blocks from Kaithal district, Hisar I and Hisar II from Hisar district and Bhiwani and Bawanikhera blocks from

Received 13-06-2023; Accepted 30-06-2023

Bhiwani district were selected for the study. A total of twelve villages were selected randomly for the study by selecting two villages from each block. With the help of expert opinion and progressive farmers, fifteen farmers from each village is selected constituting 60 farmers from each district. In addition, 20 extension functionaries from each district were also contacted for the study. Thus a total sample size of present study was 240 comprising 180 farmers and 60 extension functionaries. The primary data were collected from the respondents by interview and focus group discussion. In this study, factors affecting farm diversification is assessed through three different measures based on the set criteria. Index values calculated for assessing importance of different factors affecting farm diversification at macro level. Garret ranking was used for identification of factors affecting diversification at micro level. For assessing the importance of factors disfavouring from paddy to alternate crops, RBQ method was followed.

Factors affecting farm diversification were listed with the help of review of literature and expert consultation. The respondents were provided with a list of factors and were asked to indicate score for each item. Then, score assigned by respondents were converted into index by applying the following formula. Factors were measured with help of Likert's three point scale

$$\text{Index} = \frac{\text{Obtained score}}{\text{Maximum obtainable score}} \times 100$$

Garrett's ranking technique (Garret & Woodworth, 1973) was used to rank the major factors of diversification which are prevalent in the study area. The respondents were provided with a list of parameters and were asked to indicate their rank for each item. Then, ranks assigned by respondents were converted into per cent position by applying the standard formula.

Finding the best alternatives for overcoming limitations and encouraging farm diversification was made possible by the examination of the constraints. Through a participatory approach, the characteristics that make the adoption of non-paddy crops unfavourable were discovered. The respondents were asked to list the constraints that prevented them from adopting non-paddy crops, and this was done using the preferential ranking technique. The major constraints were first identified by literature review and expert opinion. Based on that, in all 4 major Kharif crops (maize, pearl millet, sorghum and cotton) 16 constraints were listed. The intensity of these perceived constraints in the actual field situation was measured to determine the extent to which farmers perceived them as constraints in agricultural production. Farmers were also asked to indicate their opinion for constraints that they perceive as limiting agricultural production. The data collected in this way were tabulated and analyzed statistically to interpret the results. To quantify the data, the constraints were ranked based on the responses obtained from the respondents and then calculated the Rank Based Quotient (RBQ) as advocated by Sabarathnam (1988).

RESULTS AND DISCUSSION

Table 1 depicts the proximity of NCR (0.896), increased road density (0.857) and improved access to market information (0.801) were found to have major implicit in favoring diversification in Haryana state. The location of districts bordering Delhi has a major advantage in terms of potential market opportunities, as farmers have an assured disposal of farm produce. Moreover, the well laid - out road facilities smoothens the transport of farm produce in order to reach the destination markets within the shortest possible time period. Further, progressive farmers maintain the well –knit link with middleman in NCR and urban clusters which also hasten opportunities for these diversified farmers for disposal of the produce. Good market and market knowledge can help farmers bypass middlemen when selling crops and thus get more profit. Market uncertainties (0.876) and climate induced factors (0.796) were perceived to hinder the farm diversification. Mostly market risks are related to cost, price, and market uncertainty. It might also encourage farmers to engage in risk-free activities like off-farm ventures. Due to the extreme climate conditions, crop yields are drastically reduced, which may compel farmers to give up farming. Farm related tasks are moving from the non-mechanized sector to well-mechanized and other simpler ways due to rising labour costs and a labour scarcity.

In case of field crops, *delay* in the *payment* brings about reduced satisfaction as a result the farmer may not show an interest for the next cropping season. The state of Haryana faces heavy losses due to lack of adequate crop specific storage. *Farmers* must be paid for their produce within a short span of time. The harvesting of the crop has been severely hampered by the acute labour shortage (Mohan, 2023). It will particularly impact crop harvests in areas with little or no established mechanization. Farmers are discouraged from undertaking new ventures, due to a lack of information about new techniques and inputs as well as insufficient abilities. Even in the majority of Haryana's crop-intensive areas, inadequate training is quite prevalent. The importance of receiving training in farm level packing, storage, processing, and value addition has been emphasized to farmers (Rani et al., 2021). Farmers should be motivated and encouraged to employ better farm management techniques, by providing demonstrations (Kumar et al., 2025). In livestock farming, dairy farmers struggle mainly due to the lack of good germplasm in indigenous cattle as purebred high-yielding animals are costlier and lesser in number. Haryana farmers experience difficulty with quality feed and fodder, efficient disease-management techniques and hurdles with milk quality. In addition, they are not receiving milk prices that are commensurate with the cost of production (Arora, 2019). The majority of farmers are still unaware of adequate livestock immunization, which results in a high mortality rate and financial losses for the farmers. Although Haryana is one of the few states that have launched the livestock insurance scheme, the response from farmers has not been positive. Disposal of unproductive animals (0.802), social taboo existing in certain communities regarding the pig farming (0.731) are found to be the major factors, inhibiting diversification in livestock sector.

Wide variations in the sale prices of horticulture products (0.803) and lack of specialized modern mandies for horticulture produce (0.658) were the major factors hindering the horticulture diversification. Due to lack of awareness, poor irrigation infrastructure, inadequate post-harvest infrastructure, price fluctuations, etc., the rate of growth of horticulture in Haryana has

Table 1. Index values of farm diversification factors in Haryana

Factors favoring diversification	Index value
Rising urbanization (per cent of urban population to total population)	0.548
Increasing proportion of small and marginal holdings in total farm holdings	0.707
Increased Road density or Proportion of all-weather road	0.857
Increased Market density (number of organized market per net sown area)	0.676
Proximity to National Capital Region/ Proximity to urban clusters	0.896
Availability of incentives for diversification	0.780
Improved access to market information	0.801
Changes in consumption pattern, life style and dietary uptake	0.548
Climate change effects (Diversification as an adaptive strategy)	0.799
Increased off-farm income level	0.778
Factors hindering diversification	
General factors	
Increased fertilizer consumption rate (kg/ha)	0.650
Labour unavailability or increasing labour cost	0.773
Market uncertainties	0.876
Climate induced factors	0.796
Hurdles in getting credit for crop and dairy farming	0.571
Difficulties in insurance coverage and settlement	0.574
Lack of adequate incentives for critical inputs	0.744
Improved Irrigation Intensity (Proportion of gross irrigated area to gross cultivated area)	0.651
Specific factors (sector wise)	
Field crops	
Lack of demand from buyers for other crops as like paddy and wheat	0.722
Lack of crop centric mechanization for all crops	0.776
Inadequate area wise and crop specific storage/processing units	0.788
Untimely procurement operations of first crop affecting sowing of second crop	0.804
Shortage of labour during in peak agricultural operations	0.870
Lack of adequate knowledge of alternative crops	0.653
Delayed payment by the procurement agencies	0.876
Livestock	
Lack of remunerative price for milk and meat	0.653
Lack of supply of good quality semen and AI facility in every village	0.658
Disposal of unproductive animals	0.802
Non-availability of critical inputs at affordable rates	0.780
Social taboo preventing pig farming	0.731
Horticulture	
Lack of specilized modern mandies for horticulture produce with cold chain and primary processing/packaging facilities	0.658
Wide fluctuations in sale prices of horticulture produce	0.803
Lack of market intelligence to avoid seasonal glut and scarcity	0.656
Inadequate knowledge of hi tech horti production	0.521
Damage of horticulture crops by wild animals including blue bull	0.568
Shortage of quality planting materials	0.630
Less awareness of market interventions of horticulture department	0.598
Fisheries	
Lack of knowledge for integration of fish in farming system	0.556
Poor domestic demand for fish products	0.732
Input availability and accessibility at affordable rates	0.793
Rising urbanization (per cent of urban population to total population)	0.548
Increasing proportion of small and marginal holdings in total farm holdings	0.707
Increased Road density or Proportion of all-weather road	0.857
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stayed below expectations (Singh, 2021). Farmers earn good profits from horticulture, but there is little safeguard against glut, while food grains protected by a minimum support price mechanism. Lack of market intelligence, inadequate knowledge of hi tech horticulture, damage of horticulture produce by wild animals, shortage of quality planting material are the other reasons for farmers reluctance towards horticulture sector. According to Kaur et al., (2023) state horticulture can reach to an appropriate level by installing suitable cold storage facilities for perishable horticulture crops and creating a more effective system for educating farmers. Bansal et al., (2020) reported that the farmers found difficulty in selling their produce in the nearby market and had to go far, which added more cost and decreased their share of return. Input availability (0.793), lack of trained manpower (0.793) and poor domestic demand of fish (0.732) were the major factors hindering fish farming. Lack of knowledge regarding integration in fish farming, lack of remunerative fish MSP policy, wide price variations, high price of fish seed and lack of cold storages at local level are the other constraints of fish farmers. Training programmes for farmers are urgently sought to enhance shrimp farming.

Diversification factors at micro level

The factors affecting farm diversification at micro level throw light on only the major factors which are disclosed by the respondents of the surveyed area. Ranking of these factors helps to identify the most prominent factors that decide the diversification preferences. Factors affecting farm diversification at macro level gives a larger view of the factors affecting the entire state of Haryana, which were revealed by literature and expert opinion, whereas at micro level, the factors pertaining to the respondents' point of view on diversification at household level, are deliberated

Information provided in Table 2 shows that the respondents had given preponderance to meeting family requirements with score value of 76.30 as they can be able to derive multiple products by diversifying their farms. At the same time, profit enhancement (70.17) would be the prime criterion for farm diversification as farmers always expect assured income. Farm diversification can also help in reducing the risk and uncertainties as revealed by the score value of 63.4 with third rank as it is possible to shift or share the risk burden which might be challenging in solo enterprise. Better resource utilization emerged as fourth ranked factor as wastage can be drastically reduced with multiple farm enterprises. Based on the advice from experts (50.17) of agriculture and horticulture department, some people opted diversification as a strategy for water conservation. Increasing consumption demand to milk, egg, fish and meat (49.83) encouraged some farmers to change the farming system pattern. The rising trend of back yard poultry and village ponds reveals this change. Farm diversification policies provide incentives (38.93) to farmers in order to improve the adoption rate of different enterprises. Diversity is essential for proper balance of ecosystem. Moreover, diversification towards non paddy-wheat crops helps in conserving soil and water quality. Different crops and animals are maintained by farmers as part of their culture (23.80). Most farmers preferred Murrah buffalo and at their farm due to traditional attachment and awareness of benefits from such breed.

Table 2. Ranking of diversification factors at micro level using Garret method

S.No.	Diversification factors	Average score	Rank
1.	Meeting family requirements	76.30	I
2.	Enhancing profit from farm	70.17	II
3.	Reducing risk and uncertainties	63.4	III
4.	Better resource utilization in farm	56.93	IV
5.	Motivation from authorities	50.17	V
6.	Change in consumption pattern	49.83	VI
7.	Availing subsidy from government	38.93	VII
8.	Conservation of agro-ecology	34.00	VIII
9.	Maintaining culture and tradition	23.80	IX

Ranking of disfavouring factors of diversification (using RBQ value)

Table 3 shows that the non-availability of labour for manual harvesting at an affordable rate was reported as a major factor in the non-adoption of maize, sorghum, pearl millet and cotton. In addition, insufficient prices and lack of assurance are the factors

Table 3. Ranking of factors (using RBQ value) which disfavour diversification from paddy to alternate crops

Crops	Factors disfavoring diversification from paddy	RBQ value	Ranks
Maize	Non availability of labour for manual harvesting	51.39	I
	No assurance to the price of the produce	50.02	II
	Crop damages by birds, stray cattle and pest attack	44.44	III
Sorghum	Non availability of labour for manual harvesting	52.50	I
	Less productivity (532 kg/ha)	47.22	II
	Lack of adequate marketing facilities	40.08	III
	Inadequate minimum support price	31.94	IV
Pearl millet	Non availability of labour for manual harvesting	48.89	I
	Less productivity (1609 kg/ha)	46.11	II
Cotton	Non availability of labour for regular picking up of cotton	43.06	I
	Inability of Bt cotton to withstand in stagnant water due to lack of tap root system	39.58	II
	Root rot, fusarium wilt and viral diseases	25.00	III
	Storage problems	22.92	IV
Vegetables	Non availability of labour for periodical plucking	34.81	I
	Wide price fluctuation	33.33	II

leading to the non-adoption of crops such as sorghum and maize. Paddy cultivation is fully mechanized from sowing to harvesting. But the mechanization facilities are lacking in every stages of other suggested alternate crops. Owing to this people shows reduced interest in cultivating these kharif crops. Strict government policies related to the procurement of produce at MSP in maize and sorghum can further promote adoption of these crops. The areas that are suited for cotton cultivation should get promotion through adequate pest management measures. A study related to cotton cultivation in Haryana indicates that the usage of drip irrigation technology has proved to be major reason of change in the status of the farmers in Haryana (Kumari et al., 2022).

CONCLUSION

In the context of ground water declining scenario, diversification is an essential requirement for the state like Haryana. Certain factors have much impact on promoting diversification like increased road density, improved access to market information and proximity to NCR etc. do not create the same impact in all regions like, the access to market information possessed by progressive farmers differs from those who are deprived of those facilities, and areas with well-developed transportation infrastructure are significantly superior to those that lack the same. However, among these resource-constrained farmers, there is a significant potential for diversification. So the policy makers can take appropriate measures to address this. Other fact revealed that, paddy cultivation is fully mechanized from sowing to harvesting, whereas, mechanization is lacking in every stages of alternate crops. Strict government policies related to the procurement of other than paddy crops at MSP may address this issue.

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